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How Child Labor and Child Schooling Interact with Adult Labor

Ranjan Ray

The link between household poverty and child labor is much stronger in Pakistan than in Peru. Providing good schools in South Asia could help reduce child labor. The link between child labor and adult labor markets varies with gender.

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Summary findings

Using data from Peruvian and Pakistani household surveys, Ray tests the hypotheses of a positive association between child labor hours and poverty and a negative association between child schooling and poverty.

Both hypotheses are confirmed using Pakistani data but not using Peruvian data.

What explains these divergent results?

The link between household poverty and child labor is much stronger in Pakistan than in Peru — perhaps partly because Pakistani schools are not as good as those in Peru, and perhaps partly because Pakistani families value education less, especially for girls. Also, Peruvian children combine schooling with employment, unlike Pakistani children.

Rising wages for men significantly reduce the labor hours of Peruvian girls. Strong complementarity exists between the labor market for women and that for girls in Pakistan.

Providing good schools in South Asia could help reduce child labor and break the strong link there between poverty and hours spent in child labor.

Data from both countries confirm the positive role more adult education can play in improving child welfare. Adult education's impact on child labor is considerably greater in Pakistan than in Peru. One generation's lack of skills and education causes the next to remain uneducated and unskilled as well.

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by

Ranjan Ray*

School of Economics
University of Tasmania
GPO Box 252-85
Hobart Tas 7001

Email: Ranjan.Ray@utas.edu.au
Fax: +61 (0)3 6226 7587
Tel: +61 (0)3 6226 2275

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1. Introduction

There has been, in recent years, a growing interest in the subject of child labour among academics, professionals and the media. Though the ILO (1996a)'s estimates on labour force participation rates for children aged 10-14 years show a declining trend, in absolute terms the size of the child labour force is and will continue to be large enough to be of serious concern. According to the ILO, in 1990 there were almost 79 million children around the world who did regular work [see Ashagrie (1993, p.16)]. Kebebew Ashagrie was the first person to put together an international data set on child labour. His figure on the size of child labour has since been revised upwards to 120 million children between the age of 5-14 years doing full time[1], paid work [ILO (1996b), Ashagrie (1998)]. The estimate of child labour would vary depending on how we define work,[2] how we define a child, and how we collect the data, but few would disagree that this is a problem of gigantic proportions. The universal perception of child labour as a 'problem' stems from the widespread belief that the employment of children, especially young children, has harmful effects, including the destructive consequences for the child's intellectual and physical development. These are particularly serious for children who work in hazardous industries, risking accident and injury; there are others working in conditions that take a slower but definite toll on the child's health. Child labour does constrain the child's ability to benefit fully from schooling and education, thereby, possibly condemning her to perpetual poverty and low wage employment. Moreover, child labour is believed by many to contribute to adult employment in developing countries. For example, an enquiry into child labour by the ILO observes, "... child labour is a cause of and may even contribute to adult unemployment and low wages" [ILO (1988, p.90)]. The trade lobby in the developed countries has further argued that child labour in

[1] If one includes part time work as well, then the ILO (1996b) estimate goes up to 250 million working children.
[2] In this paper, we follow the ILO definition of child labour [see Ashagrie (1993)] in classifying a child as a 'labourer' if the child does full time, paid work. While this limits our analysis to only a subset of child work, it makes our study comparable with others in the literature.

developing countries gives them an unfair cost advantage in international trade, and that this constitutes a form of "protection" requiring corrective international action. For example, in a study of child labour in India's carpet industry, Levison, et al (1996) found that "there is a competitive cost advantage to hiring child labour with its magnitude relatively small for industrialised country sellers and consumers but relatively large for poor loom enterprise owners".

Notwithstanding almost universal agreement that child labour is undesirable, there is wide disagreement on how to tackle this problem. This partly stems from the lack of awareness of, let alone consensus on, the causes of child labour, and the consequences of banning it through legislation. There has, however, been in recent years a rapidly expanding literature on Child Labour.[3] While some of these studies [for example, Knight (1980), Horn (1995)] discussed mainly the qualitative features of child labour, the recent literature has focussed attention on the quantitative aspects taking advantage of the increasing availability of good quality data on child employment. Within the empirical literature on child labour, there has been a shift in emphasis from mere quantification to an econometric analysis of its determinants. This has coincided with a widespread realisation that simply banning child labour is unlikely to eradicate this phenomenon and may even be counterproductive. As Knight (1980, p.17) notes, "when child labour is prohibited by law, the law cannot protect child workers since they legally do not exist". An understanding of the key determinants of child labour is necessary for formulation of effective policies in reducing and eventually eliminating child labour. This view underlines the recent econometric analyses of child labour on micro data sets of developing countries. These studies had, earlier, mostly involved Latin American data on child labour, but, recently, they have extended to data sets of African and Asian countries. Examples include the studies of Psacharopoulos (1997), Cartwright and

[3] See Grootaert and Kanbur (1995), Basu (1998) for surveys.

Patrinos (1998) on Bolivian data, Grootaert (1998) on Cote d'Ivoire, Tienda (1979), Boyden (1988, 1991), Patrinos and Psacharopoulos (1997) on Peru, Psacharopoulos (1997) on Venezuela, Salazar (1988) on Colombia, Patrinos and Psacharopoulos (1995) on Paraguay, Myers (1989) on South American survey data, Bonnet (1993) on Africa as a whole, Jensen and Nielsen (1997) on Zambia, Addison, et al (1997) on Pakistan and Ghana, Chaudhuri (1997) on India, Diamond and Fayed (1998) on Egypt, and Ray (1988) on Pakistani and Peruvian data.[4]

The chief motivation of this paper is two fold:

(a) it examines on Peruvian and Pakistani data the key determinants of child labour hours and of the share of child and adult earnings in the household's total earnings, focussing attention on the similarities and dissimilarities between the Peruvian and Pakistani results. This study, hence, extends Ray (1998) which analysed child labour force participation, rather than child labour hours and, unlike here, restricted attention to child employment, and did not include adult labour earnings in the analysis. Moreover, the present study overcomes a significant limitation of our earlier analysis in estimating the child labour hours equations separately for boys and for girls.

(b) it extends the model of child labour introduced in Basu and Van (1998) by allowing a differential labour market interaction between child and adult male labour on one hand, and child and adult female labour on the other. The need to make this distinction stems from the key empirical result, discussed later, that the nature of interaction between adult male and child labour markets may be different from that between adult female and child labour markets. The importance of this distinction is sharpened by the fact that the nature of responsiveness of child labour hours to adult wage changes is quite different between the Peruvian and Pakistani data sets. The case for distinguishing[5] between male and female labour in their interaction with child labour can be traced to Grant and Hamermesh (1981) who found that youths and white women were substitutes, while youths and white men were complements in production in the US.

Another significant motivation of the present study is a text of the Luxury Axiom introduced by Basu and Van (1998, p.416). This Axiom has been stated by them as follows:

[4] See, also, the volumes edited by Bequele and Boyden (1988), Myers (1991), and Grootaert and Patrinos (1998).

[5] See Diamond and Fayed (1998) for more recent evidence in fervour of the distinction between male and female labour. Note, also, that each of the case studies in the recent volume edited by Grootaert and Patrinos (1998) recognises this distinction. I am grateful to the referee for drawing this volume to my attention.

Luxury Axiom: A family will send the children to the labour market only if the family's income from non-child-labour sources drops very low.

In view of the key role that this Axiom, along with others, plays in Basu and Van's analysis of child labour, an empirical evaluation of it is of some policy significance. The result of our test will throw light on the important question of whether poverty is the key determinant of child labour, as is widely believed to be. The use of more than one country's data is a good way to test for the universalism of this axiom, since what may be empirically true for one country need not be so for another. The choice of Peruvian and Pakistani data sets, which was made with considerable care, was dictated by principally two considerations:

(a) In view of the LSMS involvement in each case, the structure and coverage of these data sets are sufficiently similar to allow meaningful comparisons between them.

(b) These countries provide an interesting comparison because of their geographical distance from each other, besides their cultural, economic and demographic diversity. For example, the per capita GNP in Peru is more than twice that of Pakistan, while its population size is only a fifth of the latter.[6] The two countries also differ sharply in family size, in household composition between boys and girls, and in the educational experience and work practice of its women and children.

Child labour takes different form in different regions. Cross country comparisons, especially involving different cultures and continents, enable better understanding of differences in the policies required to maximise their effectiveness in specific regional contexts. We observe some interesting dissimilarities between the results of the Peruvian and Pakistani regressions. The most significant of these is the fact that the nature of interrelation between the adult male, adult female and child labour markets is sharply different between the two countries.

We also examine the role of community infrastructure by including some community variables in the estimating regressions. The estimates allow an interesting comparison

[6] See Lancaster, Ray and Valenzuela (1999, Table 3).

between countries on the impact of community infrastructure on child labour hours and child schooling. The results are of considerable practical significance since the community variables provide potential instruments in devising effective polices that improve child welfare.

The rest of this paper is organised as follows. Section 2 describes the data sets, and compares some relevant child variables between Peru and Pakistan. Section 3 contains the results of estimating the child labour supply and child schooling equations. Section 4 discusses the analytical implication of these results by distinguishing between adult male and adult female in a model of child labour. Section 5 summarises the principal findings, discusses the possible implications and suggests directions for further research.

2. The Data Sets and their Principal Features

The child labour data for the study came from the Peru Living Standards Measurement Survey in 1994 (PLSS) and the Pakistan Integrated Household Survey in 1991 (PIHS). These surveys were conducted jointly by the respective governments and the World Bank as part of the Living Standards Measurement Study (LSMS) household surveys[7] in a number of developing countries. The purpose of the LSMS surveys is to provide policy makers and researchers with individual, household and community level data needed to analyse the impact of policy initiatives on living standards of households. The Pakistan Integrated Household Survey covered 4800 households, while the Peru Living Standards Survey involved 3623 households. While the Peruvian sample contained information on child labour and child schooling of 5231 children aged 6-17 years, the Pakistani data set yielded 5867 observations on children aged 10-17 years. Some of these observations could not be used, however, because of poor quality. The construction of child wage data involved the

[7] See Grosh and Glewwe (1995) for an overview and general description of the LSMS data sets.

combination of income and work information from a number of sources. The wage and labour hours relate to children involved in full time labour pursuits outside the home, and receiving direct or indirect cash payments for their labour. The wages of children, who worked on their family farm, were calculated from the information on farm income and on the corresponding adult, child labour hours contained in the surveys. Since a central motivation of this exercise is to investigate the economic determinants of child labour, for example, the household's poverty status and, especially, child wages, we do not consider in the substantive part of this study, child work that involves purely household chores nor do we study other forms of child labour that do not attract, explicitly or implicitly, cash remuneration. This limits the scope of our analysis somewhat, but makes this study consistent with the ILO definition of child labour which identifies it with "economically active" children [see Ashagrie (1993)]. In case of Peru, which does not provide information on child hours spent on unpaid domestic work, we, therefore, utilised the entire available information on child labour. In case of Pakistan, while boys were assumed to be not involved in domestic work by the survey designers, household chores accounted, on average, for over 90% of girls' total labour hours. We, therefore, investigate in the latter part of this study the sensitivity of our results to the recognition of unpaid, domestic hours as child labour in the case of Pakistani girls for whom such information was available.

Tables 1, 2 present the age specific participation rates of Peruvian and Pakistani children in the labour market and in schooling. The following remarks apply. First, in both countries, child labour participation rates increase with child age. In case of schooling, however, while the enrolment of Peruvian children peaks around 13 years, in Pakistan the rate peaks earlier at 11 years, and falls continuously to alarmingly low levels, especially for older girls. Second, the gender picture is similar between the two countries with respect to child labour. In case of child schooling, however, the strong gender disparity in the Pakistani

sample contrasts sharply with a more even gender balance in the Peruvian case. Third, the schooling participation rates of Peruvian children in all age groups are consistently higher than their Pakistani counterparts.

The figures on school enrolment rates reflect the lack of good schools in Pakistan, compared to Peru. As Basu (1998, p.9,10) points out, "even the mere availability of good-quality schooling can do a lot" in reducing child labour. Moreover, strict Islamic laws that keep women at home, possibly, explain the sharp fall in the school enrolment rate of older Pakistani girls, especially in the age groups 11-16 years. Table 2 shows that, in the age group 11-16 years, the employment and school enrolment rates of Pakistani boys move quite sharply in opposite directions, thus, suggesting that, unlike Peruvian children, they drop out of schooling completely to enter the labour market. This is consistent with the observation of Weiner (1996) on Indian child labour: "most of the 90 million children not in school are working children". It is, incidentally, worth noting that some of Weiner's "working children" are not included as child labourers in the present study because they do not receive wages.[8]

Further comparisons between key characteristics in the two data sets can be made from the sample means presented in Table 3. The following points are worth noting. First, a typical Pakistani household contains more children than the Peruvian family. Second, on poverty lines defined as 50% of sample median of non child equivalent household income, the figures on the percentage of children living in poverty are seen to be quite similar between the two countries. If we include child earnings in the household income, these figures fall to 29.26 (boys), 29.00 (girls) for Peru, and 23.41 (boys), 23.68 (girls) for Pakistan. This points to the small but perceptible contribution made by children to pulling households out of poverty, with this contribution being somewhat larger in the case of Pakistani children. Third, in relation to Peru, the proportion of Pakistani children who have

[8] Cartwright and Patrinos (1998), for example, classify child workers who do not attend school and are not formally employed as "home care workers".

never attended schooling is alarmingly high. Fourth, the gender disparity in the educational experience of Pakistani children, observed earlier, holds in case of their adults as well. On average, the most educated female in the Pakistani household has only 39% of the schooling experience of the adult male compared to the corresponding figure of 89% in the Peruvian household. The educational deprivation of the adult female in Pakistan is further reflected in the fact that, unlike in Peru, she has experienced much less schooling than her child. Fourth, in relation to the adult male, the female works much less hours in outside paid employment in Pakistan compared to Peru. This feature, which reflects Islamic laws that constrain the female's outside work involvement, is reflected in the much higher ratio of the child's labour hours to that of the female in Pakistan than in Peru. Such wide disparities between some of the key characteristics of the two country samples justify the choice of these two data sets as discussed earlier.

Table 4 compares the earnings shares of men, women and children between the two countries. The Peruvian adult female contributes a much larger share of the household earnings than the Pakistani female. This is consistent with the comparable sample characteristics, presented in Table 3, especially the fact that females are much less educated in relation to the male in Pakistan than in Peru and, hence, have much less earning power. It is also interesting to note the much higher dependence of the household on child earnings in Pakistan than in Peru. The child in Pakistan lags only marginally behind the adult female in her/his share of household earnings. This largely explains the result, presented and discussed later, that commercially paid, child labour hours are much more responsive to household poverty in Pakistan than in Peru.

3. Estimation Method and Empirical Results

The estimation method was based on the two step procedure, discussed in Maddala (1983, Sec. 6.11), for estimating labour supply equations after correcting for sample selectivity. The results were obtained using the LIMDEP programme written by Greene (1995, p.653-659) which implements this procedure. We ensured that the child labour and child schooling equations, that were estimated, are pure reduced form equations with none of the variables on the right hand side likely to suffer from endogeneity.

Table 5, 6 present the estimates of the coefficients of the selectivity corrected regressions in Peru and Pakistan, respectively, of child labour hours on the various determinants. Keeping in mind the possibility that the supply of child labour depends on the gender of the child, these tables report the results of separate estimation of child labour hours for boys and girls. Since a key motivation of our exercise is a test of Basu and Van (1998)'s Luxury Axiom, the poverty status of a household was defined with respect to a poverty line that is set at 50% of the sample median of the distribution of per adult equivalent non child household income.

The following features are worth noting from the tables.

(i) Peru and Pakistan disagree on the validity of the Luxury Axiom. The estimated coefficient of the poverty variable is weak and statistically insignificant for both child sexes in Peru, but quite the reverse in Pakistan. A previously non poor Pakistani household will increase the outside, paid employment of its children quite substantially, namely, by approximately 500 child labour hours annually for each child, if it goes below the poverty line, exactly as predicted by the Luxury Axiom. The reverse is indicated for Peru. This mixed response to a test of the Luxury Axiom between Peru and Pakistan is consistent with our earlier observation that Pakistani children, especially boys, play a greater role in pulling households out of poverty than Peruvian children. The Pakistani result, though not the Peruvian one, appears to contradict the observation of Bhatty (1998) who cites a variety of empirical studies on Indian child labour in support of the view that "income and related variables do not seem to have any direct significant effect on children's work input". However, as we report below, this contradiction is partly resolved and the evidence in favour of the Luxury Axiom weakens in case of Pakistani girl labour if we extend the definition of child labour to include domestic work.

(ii) Other interesting comparisons may be made between the Peruvian and Pakistani results. The insignificance of the coefficient of the squared age variable suggests a linear relationship between child labour hours and child age in both countries. However, unlike in Peru, there is a sizeable gender differential in favour of boys in Pakistan, on the magnitude of impact of increasing age on a child's labour supply. Note, however, that this differential may be more apparent than real, since older girls in Pakistan are likely to be increasingly involved in unpaid domestic work, which we have not considered in the child labour estimations reported so far.

(iii) Ceteris Paribus, in both countries and in case of both sexes, urban children work less hours than their rural counterpart, possibly, reflecting the importance of rural farm employment as a destination of child labour in these primarily agricultural countries. It is interesting to note, however, that in absolute terms, while the estimated coefficient of the Region of residence variable for girl labour exceeds that of boys in Peru, the reverse is indicated for Pakistan.

(iv) While both countries agree on the positive role that increasing education of the adults in the household plays in reducing both boys' and girls' child labour, these effects are much stronger in both size and significance in Pakistan than in Peru. Moreover, the community variables, generally, exert significant impact on child labour hours, with the estimated coefficients, mostly but not always, having the expected sign. For example, a deterioration in the sewerage disposal system sharply increases girl labour hours in Pakistan and, for both sexes, child labour hours in Peru, but reduces the boys' labour hours in Pakistan. The significant impact of community variables on child labour is confirmed by the rejection of the joint hypothesis of no community infrastructure effects in all the cases reported in Tables 5, 6.

(v) Without exception, child labour hours respond positively and significantly to child wage. Of particular interest in these regression results are the estimated coefficients of the adult wage variables, for they indicate the nature of interaction between the child and adult labour markets. The estimated coefficients differ in sign and magnitude both between child sexes and between countries. In Peru, increasing adult wages reduce child labour in case of both boys and girls, thereby, suggesting that child and adult labour hours are substitutes in that country. In contrast, rising female wages sharply increase the labour hours of Pakistani girls, but have negligible impact on the labour hours of Pakistani boys. Note, however, that the statistical significance and negative impact of the quadratic female wage effects in case of Pakistani girls suggests that this relationship is non linear and weakens in the higher age categories [see, also, Basu (1993)]. The Pakistani finding indicates that in the absence of good schools and satisfactory day care arrangements, if the mother works, she has to put her child to work as well. A comparison of the estimated coefficients of the adult wage variables in case of Pakistan shows that the nature of interaction between the child labour market, especially that of the girl, and that of the adult female is quite different from that between the child and the adult male labour markets.

The reader will recall that the results presented in Tables 5, 6 relate to child labour hours involved in full time, paid employment. To investigate the robustness of these results to

a more relaxed treatment of child labour, we now go beyond the ILO definition of child labour as "economically active" children to include child labour hours spent on domestic work. Such information was, however, only available for Pakistani girl labour. The results of estimating the Pakistani girl labour equations with and without domestic duties are presented and compared in Table 7. Two features of these results are worth mentioning.

(i) With the inclusion of domestic duties in the definition of child labour, the impact of poverty on a girl child's labour hours weakens sharply from 473 to 60 annual hours and the statistical significance of the estimated coefficient of the poverty variable disappears. In other words, Pakistani girls fall in line with Peruvian children in failing to find strong evidence in support of the Luxury Axiom. Clearly, when a household falls into poverty in Pakistan, the girl child, having to work more hours in outside, paid employment, is able to devote less hours on household chores. Consequently, the overall impact of poverty on her labour hours weakens sharply on the inclusion of domestic duties as child labour.

(ii) The absolute magnitude and significance of several of the other variables, also, weaken sharply with the recognition of child hours spent on household chores as child labour. Note, however, that rising female education continues to have a significantly negative impact on child labour hours. It is interesting to note, however, that the impact of male education on child labour weakens sharply and loses its statistical significance on the inclusion of domestic duties. Similarly, the magnitude and significance of the female wage coefficients weaken sharply on the inclusion of household work in the definition of child labour, with the squared female wage coefficient losing its strong statistical significance. Note, however, that our earlier remark that the response of child labour hours in Pakistan to changes in male wages is quite different from that to female wage changes is robust to the alternative definitions of child labour. On a likelihood ratio test, the community variables continue to have a significant impact on child labour, even in the presence of domestic duties.

Tables 8, 9 present the estimated regression coefficients of years of child schooling on the various determinants in the two countries. If one extends Basu and Van (1998)'s Luxury Axiom to the context of schooling to predict that a household will not send its children to school if it falls into poverty, then a negative and statistically significant coefficient of the poverty variable will provide confirmation of this Axiom. As in the case of child labour and, hence, consistent with the earlier results, the Peruvian evidence on child schooling, especially for Peruvian girls, contradicts the Luxury Axiom, but the Pakistan evidence confirms it. The

latter is true of both the child sexes, especially of Pakistani girls. This provides confirmation of our earlier observation, also noted by Weiner (1996), Basu (1998) and others, that South Asian children, especially girls from poor households, drop out of schooling to enter the labour market. The lack of good schools in Pakistan with the consequent discount that parents place on the value of their child's education, possibly, explains this result. The gender differential between the child sexes in Pakistan in this respect is quite revealing, with girls experiencing a much sharper reduction than boys in their schooling, when their households fall into poverty. In contrast to Pakistan, Peruvian children register much smaller and statistically insignificant changes in their schooling as they slip into poverty, with Peruvian girls even registering a small increase. This partly reflects a much higher valuation that Peruvian parents place on their child's education and, partly, the fact, as observed by Patrinos and Psacharopulos (1997) in their study of Peruvian child labour, that children there combine employment with schooling to a greater extent than in other countries. As these authors comment (p. 398), "working actually makes it possible for the children to go to school."

Increasing education of adults have a positive effect on their children's' schooling in both countries. The more educated parents in both countries, especially in Pakistan, see the value of their child's education, and resist the temptation to pull the child out of schooling and put her/him into paid employment. Rising child wages increase the opportunity cost of education and significantly reduce child schooling in Pakistan but have a statistically insignificant impact in Peru. The close complementarity between girls' and female labour, observed earlier in Pakistan, is consistent with the negative impact that rising female wages there have on child schooling. In other words, when female wages rise, the working mother tends to pull the daughter out of schooling and take the child to work alongside herself. It is worth noting that no such relationship exists in Peru. It is, also, interesting to observe that

girls in Pakistan, though not boys, experience significantly more schooling in the urban areas than in the rural countryside.

The regression estimates presented and discussed in Tables 5, 6 relate to the individualistic labour supply behaviour of children in the household. This is in line with the "collective" models of household behaviour that have been proposed recently [see, for example, Alderman, et al(1995)]. While such models are attractive from a policy viewpoint, especially since welfare analysis stems from and should explicitly relate to individual behaviour, they have one significant limitation in the current context. This follows from the fact that the decision on a child's labour force participation and on her hours of work, leisure and schooling are, typically, taken by the adult, not by the child herself. The conventional treatment of the household in the 'unitary' models may therefore be of some relevance in this case. Moreover, the share of household earnings contributed by the adult male, the adult female and, especially, the child, and their responsiveness to changes in key household and community characteristics are of direct policy concern.

To provide empirical evidence on this issue, we estimated the following three equation earnings share system:

$$w_i = a_i + \sum_{j=1}^{m} \alpha_{ij}^{*} (\text{family})_j + \sum_{j=1}^{n} \alpha_{ij}^{**} (\text{community})_j + \sum_{j=1}^{3} \gamma_{ij} (\text{wage})_j + \beta_i K \qquad (1)$$

$$i = 1, 2, 3$$

where w_i is earnings share of i (adult male, adult female and child), $(\text{family})_j$ denotes the family's j^{th} characteristic, $(\text{community})_j$ denotes the j^{th} community variable, and $(\text{wage})_j$ denotes the maximum wage attracted by the male, female and child workers in that household. K is the poverty variable, as defined earlier over non child labour income, taking the value 1 if the household is below the poverty line, 0 otherwise. The 'adding up'

conditions, $\sum a_i = 1, \sum_i \alpha_{ij}^{*} = \sum_i \alpha_{ij}^{**} = \sum_i \gamma_{ij} = \sum \beta_i = 0$ follow from the fact that $\sum_{i=1}^{3} w_i = 1$ in each household. To keep the calculations simple, we have estimated only on the Pakistan data set, and used a selection of the household characteristics from the previous regressions.

The results of estimating equation (1) are presented in Table 10. Let us recall from Table 4 that, in Pakistan, on average, children contribute to a non-trivial share (5.92%) of the household earnings, not far below the share (8.77%) of the adult female. This points to child labour income as a significant source of earnings for many households in Pakistan. The following features follow from the Table. First, the poverty status of a household has a highly significant impact on the earning shares of its men, women and children. When a Pakistani household crosses the poverty line from above, ie. falls into poverty, the earnings share of its women and children increase significantly, at the expense of that of its men. This reflects the fact that poor households reside in regions with limited employment opportunities for its male members. This, coupled with the fact that the men in such households generally lack the skills needed in high wage employment, increases the household's dependence on female and child earnings to pull itself out of poverty. This provides further confirmation of the Luxury Axiom in the context of paid, full time, Pakistani child labour. Second, with increasing education of the adult members of the household, especially of its females, the household's dependence on child labour, as measured by the share of child earnings, falls significantly. This is consistent with the negative impact of rising adult education on child labour hours noted earlier. Third, rising wages of male and female members exert significantly positive impact on their own earnings share in the household but decrease that of one another. Notwithstanding the positive impact of increasing female wages on girl labour hours in Pakistan, noted earlier, the corresponding impact on the child's earnings share is very small in both size and significance. Fourth, neither the region of residence, nor the community variables have any significant impact on the earnings share of men, women and children in

the household. Finally, female headed households, because of their higher vulnerability to poverty, are much more dependent on adult female and child earnings than the male headed households.

4. Some Analytical Implications

One of the main empirical results of this study is the differential response of child labour hours to male and female wage changes. In particular, the positive coefficient estimate of the impact of female wage in Pakistan on child labour supply would appear to be somewhat inconsistent with Basu and Van (1998, p.416)'s 'Luxury Axiom', namely, that child labour will decline if adult income rises. This inconsistency is reinforced in the case of Peru, but not Pakistan, by the lack of any significant positive correlation between child labour and household poverty. This raises the question: does our empirical evidence show that the Basu and Van assumption about household altruism is false or, in other words, is their specification of the household's objective function flawed? While this may be so, and any conclusion must at best be considered tentative in the absence of more empirical research, it is possible to extend the Basu and Van analysis by sticking to their objective function, but arguing that the differential response is the consequence of a complication in the household's budget constraint. In particular, we will assume what seems to be realistic in the South Asian context, namely, (a) the norm of looking after the child is primarily the mother's responsibility, and (b) the absence of good schools and suitable child care facilities. A consequence of (a) and (b) is that if a child has to stay at home, then the mother cannot go out to work. This view leads us to the following Axiom that replaces the Luxury Axiom of Basu and Van (1998).

Complementarity Axiom: From the household's point of view, in the absence of good schools, a rise in female wages will lead to an increase in child labour. Alternatively, in the absence of good schools, child

labour responds differently to male and female wages with the latter correlated positively with child employment.

To model this behaviour, we take a variant of the Basu and Van utility function as follows:

$$u=(c-s)(1-e+\delta) \tag{2}$$

where c is the household's total consumption , e ε [0,1] is the child's labour supply (or effort), so that (1 – e) is the child's leisure, and s, $\delta > 0$ are parameters. While s may be thought of as 'subsistence consumption', δ (> 0) ensures a positive marginal utility of consumption of the household whether or not the child works, that is, for e = 0 and 1.

In view of the consequence of assumptions (a), (b) mentioned above, the household's budget constraint is now given by:

$$c \leq ew_c + d(e)w_f + w_m \tag{3}$$

where w_c, w_f and w_m are child, female and male wages, respectively, and d(e) is a dummy variable which takes a value of 1 if e = 1, ie. if child works, 0 otherwise. The augmented budget constraint (3) extends that in Basu and Van to allow for the fact that the mother earns w_f if the child goes to work, and specialises to the latter if d(e) = 1 for all e.

The household's problem is to maximise U subject to (3). Note now that, if the household chooses *not* to let its child work, ie. e = 0, then $U=(w_m-s)(1+\delta)$ since neither the mother nor the child will work. Alternatively, if e =1, then $U=(w_c+w_f+w_m-s)\delta$. Hence, the child will be sent to work if:

$$(w_c+w_f+w_m-s)\delta \geq (w_m-s)(1+\delta) \text{or,} (w_c+w_f)\delta \geq w_m-s \tag{4}$$

Hence, as female wage w_f increases, the child increases her labour supply since (4) is more likely to hold. Alternatively, as w_m increases, the child is less likely to work. Hence, with only a slight variation of the Basu and Van objective function, the augmented budget

constraint easily accommodates differential child labour supply responses to male and female wages. Note that this model is based on the assumption of non availability of decent schooling and/or satisfactory child care. If, however, such facilities are available, then a rise in female wage, w_f, does not necessarily imply that the child will work as the Peruvian evidence confirms, since she can be sent to school or put in day care. This may explain the difference between the Peruvian and Pakistani results on the relationship between child labour and female wages.

Let us now turn to the objective function itself. We consider the following CES generalisation of the Stone Geary utility function used by Basu and Van (1998, eqn. 13).

$$U(c_m, c_f, c_c, e_m, e_f, e_c) = \left[\sum_{k=1}^{3} \beta_k^1 (c_k - s_k)^{\rho_c}\right]^{1/\rho_c} + \left[\sum_{k=1}^{3} \beta_k^2 (T_k - t_k - e_k)^{\rho_e}\right]^{1/\rho_e} \qquad (5)$$

where c_k, s_k, T_k, t_k are, respectively, actual consumption, subsistence consumption, maximum time available, minimum time required for leisure and non labour activities, and e_k denotes labour hours for the male, female and the child (k = m, f, c). (5) extends the Basu and Van framework in 3 ways:

(i) it allows non zero substitution possibilities between consumption (via $\rho_c \neq 0$) and between leisure (via $\rho_e \neq 0$), and specialises to the Stone-Geary form if $\rho_c = \rho_e = 0$.

(ii) it disaggregates the household's aggregate consumption and labour supply between that of male, female and child.

(iii) in considering e_k to be a quantitative variable rather than a qualitative one, it allows analysis of the child's labour hours, rather than simply the child's labour force participation.

The corresponding household budget constraint is given by

$$p_m c_m + p_f c_f + p_c c_c = w_m e_m + w_f e_f + w_c e_c \qquad (6)$$

where p_k is the unit price of consumption of household member k (= m, f, c) and w_k is the corresponding wage rate. Maximising (5) with respect to $\{c_k, e_k\}$ subject to (6) yields, on rearranging, the following consumption and earnings equations.

$$p_i c_i = p_i s_i + \phi_i^1 \left(X - \sum_k p_k s_k \right) \tag{7}$$

$$i = m, f, c$$

$$w_i e_i = w_i T_i - w_i t_i - \phi_i^2 \left(\sum_k w_k T_k - \sum_k w_k t_k - X \right) \tag{8}$$

where

$$\phi_i^1 = \frac{\beta_i^1 (c_i - s_i)^{\rho_c}}{\sum_k \beta_k^1 (c_k - s_k)^{\rho_c}}$$

$$\phi_i^2 = \frac{\beta_i^2 (T_i - t_i - e_i)^{\rho_c}}{\sum_k \beta_k^2 (T_k - t_k - e_k)^{\rho_c}}$$

$X = \sum w_i e_i = \sum p_i c_i$, ie. we assume that the household consumes its entire earnings.

Let us now define $\delta_i = \frac{p_i c_i}{w_i e_i}$, namely, the ratio of consumption to earnings by household number i. Hence, $\delta_i > 1$ implies a net resource transfer to i, and $\delta_i < 1$, a corresponding resource outflow from i. In case of the child, it is easily verified that $\delta_i \gtreqless 1$ according as:

$$\left(p_c s_c - \phi_c^1 S \right) \gtreqless \left(w_c T_c^* - \phi_c^2 T^* \right) + \left(\phi_c^2 - \phi_c^1 \right) X \tag{9}$$

where $T_k^* = T_k - t_k, T^* = \sum_k w_k T_k^*$, and $S = \sum p_i s_i$ is the aggregate subsistence consumption in the household. (9), in turn, implies that if $\phi_c^2 \simeq 0$, and $S \simeq X$, then $\delta_c \gtreqless 1$ according as $p_c s_c \gtreqless w_c T_c^*$. Since the left hand side of this last inequality (ie. the child's subsistence

consumption) will almost certainly be less than the right hand side (ie. the maximum earnings that the child can bring), $\delta_i < 1$ in this case. This leads us to the following proposition.

Proposition: If child labour supply is inelastic with respect to aggregate household income, then in a poor household living around the subsistence level of consumption, child labour is 'exploitative' in the sense that the child's earnings exceed her/his consumption, ie. it leads to a net resource outflow from the child.

The above discussion also suggests the following:

(i) Because of the appearance of X on the right hand side of (9), the nature of the inequality would change over the expenditure distribution. In other words, as X increases, child labour will at some point cease to be 'exploitative' in the above sense.

(ii) (9) can be rearranged to yield the following:

$\delta_c \gtreqless 1$ according as:

$$X \gtreqless \frac{\left(w_c T_c^* - p_c s_c\right) + \left(\phi_c^1 S - \phi_c^2 T^*\right)}{\left(\phi_c^1 - \phi_c^2\right)} \tag{10}$$

(10) yields the following cut off point for aggregate household expenditure when the resource flow from the child changes direction.

$$X^* = \frac{\left(w_c T_c^* - p_c s_c\right) + \left(\phi_c^1 S - \phi_c^2 T^*\right)}{\left(\phi_c^1 - \phi_c^2\right)}$$

$$= \frac{\left(1 - \phi_c^2\right) w_c T_c^* - p_c s_c + \left(\phi_c^1 S - \phi_c^2 w_m T_m^* - \phi_c^2 w_f T_f^*\right)}{\left(\phi_c^1 - \phi_c^2\right)} \tag{11}$$

(11) suggests that the authorities could influence the cut off expenditures as follows. By providing better schools, recreational facilities and/or improved child care, the authorities increase t_c, namely, the minimum non-labour time required by the child, thus, lowering T_c^* and, hence, reducing the cut off point at which child labour ceases to be 'exploitive' in the sense discussed above.

5. Summary and Conclusions

This paper proposes and applies a simple test of the hypothesis that there is a positive association between child labour hours and household poverty. Such a hypothesis, referred to as the 'Luxury Axiom' by Basu and Van (1998) and seen to play a key role in their analysis, is based on the idea of parental altruism, namely, that adults send children to work only if the income from non child labour falls to very low levels. We extend this idea to the context of children's education to imply a negative association between years of child schooling and household poverty. In other words, parents will reduce the schooling of their children if the household's adult earnings fall below the poverty line.

Both these hypotheses were tested on the household survey data sets of Peru and Pakistan. These countries were chosen because, besides consistency between their data sets with respect to various definitions, sources, etc. because of the LSMS involvement in each case, these country samples differ substantially in some key socio economic and demographic characteristics. For example, at sample mean, the share of child earnings in the household's total earnings is considerably higher in Pakistan then in Peru, but quite the reverse in case of adult female earnings. Consequently, we observe from a comparison of poverty rates in the two countries, based on adult (i.e. non child) and aggregate earnings, that income from child labour pull more households out of poverty in Pakistan than in Peru. These data sets provide, therefore, a good basis for a test of the various hypotheses on child labour and child schooling, and allow an interesting comparison between the results of the two countries.

The hypothesised relationships between child labour and household poverty, and between child schooling and household poverty are both strongly confirmed by the Pakistan data on these variables of child behaviour. When a Pakistani household falls into poverty, i.e. crosses the poverty line from above as defined over non child household income, it significantly and substantially increases its children's involvement in outside, paid

employment by approximately 500 hours annually for every child, just as the "Luxury Axiom" predicts. Such a household is, also, seen to reduce the schooling of its children, with the reduction being much larger for Pakistani girls than boys. In contrast, the Peruvian data fails to detect any significant association either between household poverty and child labour, or between household poverty and child schooling. While any attempted explanation for these asymmetric results between the two countries must, pending further research, be speculative, the results do point to the lack of good schools in Pakistan, compared to Peru, and the discount that Pakistani parents place on the value and relevance of their children's education. Consequently, when a household falls into poverty in Pakistan, parents withdraw their children, especially the girls, from schooling and send them to paid employment. This does not happen in Peru, or at least to the same extent, because of a more positive parental attitude towards children's education there. Moreover, as others have recently observed, Peruvian children combine employment with schooling, quite unlike Pakistani children. Our results on Pakistani child labour are consistent with the views expressed by several commentators that the provision of good schools can do a lot in reducing child labour in South Asia and in breaking the strong link that exists there between poverty and child labour hours. While the relationships that have been estimated here are pure reduced form equations, the present results point to the need to model and analyse child employment and child schooling simultaneously in future work – see Rosenzweig and Evenson (1977) for an example of such an exercise.

The Peruvian and Pakistani estimates also differ on the responsiveness of child labour hours to changes in adult wages. In Peru, rising adult male wages significantly reduce the labour hours of girl child labour, while in Pakistan rising adult female wages have a large and significantly positive impact on girl labour hours. The close complementarity witnessed in Pakistan between the girl child and adult female labour markets does not appear to hold for

others, thus, confirming that the nature of these relationships vary between child/adult sexes and between countries.

Both countries agree on the positive role that increasing adult education, especially mother's education, can play in influencing child labour and child schooling. It is worth recalling that the size and significance of the impact of adult education on both child labour and child schooling are considerably higher in Pakistan than in Peru. This points to the important role that adult education can play in Pakistan in improving child welfare. The adult female in Pakistan is, on average, much less educated than her counterpart in Peru and, consequently, values education for her child less than the Peruvian parent. This, coupled with the lack of good schools and satisfactory child care in Pakistan noted earlier, explains the validity of the Luxury Axiom and the close complementarity between the adult female and girl child labour markets seen in Pakistan, unlike in Peru. This sets up a vicous intergenerational cycle of educational backwardness in Pakistan where the lack of education and skills of one generation cause the next to remain uneducated and unskilled as well. A large and sustained investment in adult education and schooling infrastructure is a necessary condition for this cycle to be broken.

Child labour, however undesirable, is still an undeniable reality in several developing countries. Until recently, the issue did not figure in the empirical analysis of household behaviour. Traditional models of equivalence scales [see, for example, Ray (1983)] have concentrated exclusively on the issue of "costs of a child" rather than the "cost to a child". Child labour is a good example of how misplaced such an emphasis can be. Given its obvious policy importance, as more data sets of the sort used here become available, the analysis of child labour will attract more attention than it has done so far.

The differences between the nature of child labour in Peru and Pakistan, especially with respect to the interaction between child and adult labour markets, merits closer

examination in further research involving these and other data sets. Moreover, it is important to also look at child labour from the demand side using industry level data. There is currently an imbalance in favour of the supply side in the existing literature. There is also a need to investigate the impact of child employment on child health, since very little evidence exists on the issue. The LSMS data sets ought to provide information on child health for older children, i.e. beyond those aged 6 years, for such an investigation to be possible.

The complete elimination of child labour overnight is neither feasible nor even desirable, especially in view of the non trivial share of child labour earnings in household income. In Pakistan, for example, 3 per cent of households will continue to live in poverty if children did not contribute to the household income. Simplistic solutions like ban on child labour or international trade sanctions will merely drive the employed children from the formal to the informal sector where they are less open to scrutiny and protection from the worst effects of employment.

Table 1: Participation Rates (in percentages) of Peruvian Children in Employment and in Schooling

Age	Employment			Schooling		
	Boys	Girls	Overall	Boys	Girls	Overall
6	7.9	11.6	9.6	90.5	89.3	89.9
7	12.9	11.8	12.4	93.1	94.6	93.8
8	17.6	11.6	14.3	95.5	95.9	95.7
9	18.5	17.1	17.8	98.1	99.5	98.8
10	29.4	22.1	25.8	97.2	97.1	97.2
11	31.8	21.7	27.0	98.3	96.7	97.5
12	37.7	27.0	32.2	95.5	94.8	95.1
13	32.0	27.3	29.5	96.1	88.1	91.9
14	48.7	32.4	40.6	89.3	90.1	89.7
15	51.8	32.7	42.2	88.2	83.2	85.7
16	46.1	34.9	40.4	82.7	74.4	78.5
17	57.1	27.9	42.6	63.9	58.7	61.3
ALL	31.8	22.7	27.3	90.9	89.0	90.0

Table 2: Participation Rates (in percentages) of Pakistani Children in Employment and in Schooling

Age	Employment			Schooling		
	Boys	Girls	Overall	Boys	Girls	Overall
10	14.9	18.7	16.7	77.3	51.1	64.5
11	16.1	19.6	17.7	82.2	54.8	69.6
12	25.4	22.8	24.2	73.5	49.0	62.4
13	30.3	21.3	25.6	72.1	45.3	58.1
14	36.3	28.3	32.2	66.8	39.0	52.6
15	39.8	29.8	35.0	56.9	33.4	45.7
16	51.2	26.7	39.0	50.7	28.1	39.4
17	48.4	25.8	38.9	48.8	28.2	40.1
ALL	31.3	23.9	27.8	67.2	42.2	55.2

Table 3: Comparable Characteristics at Sample Mean

		Peru	Pakistan
1.	Number of children in the household	3.84	5.61
2.	Ratio of girls to boys	0.51	0.48
3.	Percentage of children living in households below the poverty line[a]	30.42 (boys) 29.37 (girls)	27.11 (boys) 25.57 (girls)
4.	Ratio of the 'most educated' female's educational experience[b] to that of the 'most educated' male in the household	0.89	0.39
5.	Ratio of the child's to the adult male's educational experience[b]	0.64	0.68
6.	Ratio of the child's to the adult female's educational experience[b]	0.72	1.75
7.	Average age of child	11.38	13.16
8.	Percentage of households that are female headed	13.17	1.87
9.	Percentage of children living in households with electricity	61.33	95.74
10.	Percentage of children living in urban areas	59.50	53.67
11.	Ratio of child labour hours to that of adult male	.12	.13
12.	Ratio of child labour hours to that of adult female	.25	.60
13.	Percentage of children involved in some child labour	26.27	23.36
14.	Percentage of children who have not experienced any schooling	13.62	31.92

[a] The poverty line was set at 50% of the sample median of per adult equivalent non child household income.
[b] Measured in years of schooling.

Table 4: Share, at Sample[a] Mean, of Household Earnings[b] Due to Male, Female and Child

Household Member	Peru	Pakistan
Adult Male Share	0.745 (0.325)	0.853 (0.251)
Adult Female Share	0.239 (0.319)	0.088 (0.193)
Child Share	0.016 (0.076)	0.059 (0.161)

[a] The sample consists of 2873 households in Peru, and 3720 households in Pakistan.
[b] Figures in brackets denote standard deviation.

Table 5: Regression Estimates[a] of Child Labour Supply Equations in Peru

Variable	Coefficient Estimate	
	Boys	**Girls**
Constant	-3439.6[d] (448.65)	-2847.0[d] (508.84)
Child Characteristics		
Age of Child	289.49[d] (71.81)	288.79[d] (81.45)
(Age of Child)^2	-3.38 (2.99)	-6.31 (3.43)
Child Wage	484.92[d] (52.32)	433.50[d] (64.32)
Family Characteristics		
Poverty Status (1, if below poverty line, 0, otherwise)	-58.63 (76.68)	-92.92 (84.65)
Region of Residence (1 = urban, 0 = rural)	-843.28[d] (93.16)	-992.09[d] (106.46)
Number of Children	50.93[d] (17.21)	13.92 (20.73)
Number of Adults	12.56 (27.60)	-29.27 (31.67)
Gender of Household Head (0 = male, 1 = female)	-15.19 (100.96)	72.72 (115.04)
Age of Household Head	1.62 (3.17)	3.34 (3.42)
Male Education	-21.70[d] (8.06)	-17.09 (9.26)
Female Education	-22.10[d] (8.29)	-24.27[c] (10.08)

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Table 5 (Continued)

Variable	Coefficient Estimate	
	Boys	**Girls**
Family Characteristics		
Male Wage[b]	-43.97	-112.42[d]
	(38.08)	(28.49)
Female Wage[b]	-16.12	-18.13
	(28.45)	(27.29)
(Male Wage)^2	-2.08	1.74[d]
	(3.41)	(.60)
(Female Wage)^2	0.69	0.21
	(0.82)	(0.53)
Community Characteristics		
Water Storage	36.76	-70.39[d]
(1 = best, 6 = worst)	(19.31)	(21.97)
Disposal of Sewerage	111.03[d]	119.52[d]
(1 = best, 6 = worst)	(22.51)	(25.64)
Electricity	-198.86[c]	-151.80
(1 = yes, 0 = no)	(90.27)	(101.62)
Joint Tests		
Community Variables	$\chi^2_3 = 47.39$[d]	$\chi^2_3 = 28.52$[d]

[a] Standard Errors in brackets
[b] In case of households with more than one working male and/or one working female, we take the maximum wage earned by them as a measure of the male and female wage, respectively.
[c] Significant at 5% level.
[d] Significant at 1% level.

Table 6: Regression Estimates[a] of Child Labour Supply Equations in Pakistan

Variable	Coefficient Estimate	
	Boys	**Girls**
Constant	-8769.40[d] (2108.08)	-9986.00[d] (2734.75)
Child Characteristics		
Age of Child	883.09[d] (311.79)	732.07 (411.55)
$(\text{Age of Child})^2$	-18.02 (11.45)	-21.17 (15.35)
Child Wage	87.88[d] (10.80)	138.05[d] (23.60)
Family Characteristics		
Poverty Status (1, if below poverty line, 0, otherwise)	491.63[d] (125.91)	472.51[d] (172.85)
Region of Residence (1 = urban, 0 = rural)	-480.75[d] (136.56)	-288.99 (188.69)
Number of Children	-11.75 (20.13)	-35.30 (27.13)
Number of Adults	-46.68 (30.50)	-57.91 (39.08)
Gender of Household Head (0 = male, 1 = female)	-221.34 (361.19)	-511.90 (509.51)
Age of Household Head	0.50 (4.47)	16.32[d] (6.00)
Male Education	-74.42[d] (12.21)	-75.44[d] (16.61)
Female Education	-77.41[d] (17.12)	-96.94[d] (25.61)

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Table 6 (Continued)

Variable	Coefficient Estimate	
	Boys	**Girls**
Family Characteristics		
Male Wage[b]	5.77 (10.10)	-11.28 (14.06)
Female Wage[b]	1.85 (14.97)	124.56[d] (18.66)
(Male Wage)^2	-.17 (.14)	.20 (.20)
(Female Wage)^2	.02 (.26)	-1.90[d] (.40)
Community Characteristics		
Water Storage (1 = best, 6 = worst)	113.57[d] (30.41)	23.38 (39.43)
Disposal of Sewerage (1 = best, 6 = worst)	-286.14[d] (53.75)	348.57[d] (76.08)
Electricity (1 = yes, 0 = no)	235.34 (233.59)	679.71[c] (317.03)
Joint Tests		
Community Variables	$\chi^2_3 = 34.53$[d]	$\chi^2_3 = 26.75$[d]

[a] Standard Errors in brackets
[b] In case of households with more than one working male and/or one working female, we take the maximum wage earned by them as a measure of the male and female wage, respectively.
[c] Significant at 5% level.
[d] Significant at 1% level.

Table 7: Sensitivity of Regression Estimates[a] of Girl Labour Supply Equation in Pakistanto the Inclusion of Domestic Work in Child Labour

Variable	Coefficient Estimate	
	Domestic Hours Included	**Domestic Hours Excluded**
Constant	-3550.2[d] (1236.79)	-9986.00[d] (2734.75)
Child Characteristics		
Age of Child	581.32[d] (185.56)	732.07 (411.55)
(Age of Child)^2	-13.98[c] (6.98)	-21.17 (15.35)
Child Wage	56.28[d] (14.89)	138.05[d] (23.60)
Family Characteristics		
Poverty Status (1, if below poverty line, 0, otherwise)	59.55 (83.88)	472.51[d] (172.85)
Region of Residence (1 = urban, 0 = rural)	-254.28[d] (86.68)	-288.99 (188.69)
Number of Children	-8.33 (12.18)	-35.30 (27.13)
Number of Adults	-107.54[d] (16.93)	-57.91 (39.08)
Gender of Household Head (0 = male, 1 = female)	-304.15 (232.64)	-511.90 (509.51)
Age of Household Head	2.70 (2.81)	16.32[d] (6.00)
Male Education	-14.08 (7.26)	-75.44[d] (16.61)
Female Education	-57.60[d] (9.47)	-96.94[d] (25.61)

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Table 7 (Continued)

Variable	Coefficient Estimate	
	Domestic Hours Included	**Domestic Hours Excluded**
Family Characteristics		
Male Wage[b]	-3.78 (6.00)	-11.28 (14.06)
Female Wage[b]	20.24[c] (9.38)	124.56[d] (18.66)
(Male Wage)^2	.071 (.083)	.20 (.20)
(Female Wage)^2	-.321 (.205)	-1.90[d] (.40)
Community Characteristics		
Water Storage (1 = best, 6 = worst)	7.39 (18.52)	23.38 (39.43)
Disposal of Sewerage (1 = best, 6 = worst)	83.56[c] (33.35)	348.57[d] (76.08)
Electricity (1 = yes, 0 = no)	-193.56 (151.85)	679.71[c] (317.03)
Joint Tests		
Community Variables	$\chi^2_3 = 10.394$[c]	$\chi^2_3 = 26.75$[d]

[a] Standard Errors in brackets
[b] In case of households with more than one working male and/or one working female, we take the maximum wage earned by them as a measure of the male and female wage, respectively.
[c] Significant at 5% level.
[d] Significant at 1% level.

Table 8: Regression Estimates[a] of Child Schooling Equations in Peru

Variable	Coefficient Estimate	
	Boys	**Girls**
Constant	-5.38[d] (.88)	-5.99[d] (.95)
Child Characteristics		
Age of Child	0.98[d] (.15)	1.08[d] (.15)
(Age of Child)^2	-0.011 (.01)	-.018[d] (.01)
Child Wage	-.204 (.13)	-.122 (.17)
Family Characteristics		
Poverty Status (1, if below poverty line, 0, otherwise)	-.175 (.17)	.220 (.17)
Region of Residence (1 = urban, 0 = rural)	.018 (.21)	-.023 (.21)
Number of Children	-.095[c] (.04)	-.098[c] (.04)
Number of Adults	-.162[d] (.06)	-.068 (.06)
Gender of Household Head (0 = male, 1 = female)	-.165 (.21)	.083 (.21)
Age of Household Head	.007 (.01)	.005 (.01)
Male Education	.040[c] (.02)	.050[d] (.02)
Female Education	.047[d] (.02)	.049[d] (.02)

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Table 8 (Continued)

Variable	Coefficient Estimate	
	Boys	**Girls**
Family Characteristics		
Male Wage[b]	.005 (.03)	.002 (.04)
Female Wage[b]	.003 (.05)	.046 (.04)
(Male Wage)^2	.000012 (.00)	-.00016 (.00)
(Female Wage)^2	.00029 (.00)	-.0010 (.00)
Community Characteristics		
Water Storage (1 = best, 6 = worst)	-.027 (.04)	-.047 (.05)
Disposal of Sewerage (1 = best, 6 = worst)	-.066 (.05)	-.075 (.05)
Electricity (1 = yes, 0 = no)	.327 (.21)	.517[c] (.21)
Joint Tests		
Community Variables	$\chi^2_3 = 7.12$	$\chi^2_3 = 14.82$[d]

[a] Standard Errors in brackets
[b] In case of households with more than one working male and/or one working female, we take the maximum wage earned by them as a measure of the male and female wage, respectively.
[c] Significant at 5% level.
[d] Significant at 1% level.

Table 9: Regression Estimates[a] of Child Schooling Equations in Pakistan

Variable	Coefficient Estimate	
	Boys	**Girls**
Constant	-7.55[d] (2.54)	-11.19[d] (3.57)
Child Characteristics		
Age of Child	0.975[c] (0.38)	1.690[d] (0.54)
(Age of Child)^2	-0.018 (.014)	-.056[d] (.020)
Child Wage	-0.194[d] (.023)	-.166[d] (.055)
Family Characteristics		
Poverty Status (1, if below poverty line, 0, otherwise)	-0.476[d] (.169)	-1.265[d] (.25)
Region of Residence (1 = urban, 0 = rural)	-.258 (.176)	.662[d] (.251)
Number of Children	.052[c] (.025)	.010 (.035)
Number of Adults	-.174[d] (.037)	-.304[d] (.049)
Gender of Household Head (0 = male, 1 = female)	.828 (.473)	1.954[d] (.630)
Age of Household Head	.005 (.006)	.009 (.008)
Male Education	.259[d] (.015)	.296[d] (.021)
Female Education	.152[d] (.019)	.367[d] (.025)

..... continued on next page

Table 9 (Continued)

Variable	Coefficient Estimate	
	Boys	Girls
Family Characteristics		
Male Wage[b]	.014 (.012)	.015 (.017)
Female Wage[b]	.015 (.020)	-.072[d] (.028)
(Male Wage)^2	.000 (.000)	.000 (.000)
(Female Wage)^2	-.001 (.00)	.001 (.00)
Community Characteristics		
Water Storage (1 = best, 6 = worst)	-.097[c] (.039)	-.188[d] (.055)
Disposal of Sewerage (1 = best, 6 = worst)	.062 (.069)	-.596[d] (.094)
Electricity (1 = yes, 0 = no)	1.002[d] (.313)	.668 (.494)
Joint Tests Community Variables	$\chi^2_3 = 19.60$[d]	$\chi^2_3 = 75.86$[d]

[a] Standard Errors in brackets
[b] In case of households with more than one working male and/or one working female, we take the maximum wage earned by them as a measure of the male and female wage, respectively.
[c] Significant at 5% level.
[d] Significant at 1% level.

Table 10: Coefficient Estimates[a] of Earnings Share Equations

Variable	Coefficient Estimate		
	Adult Male	**Adult Female**	**Child**
Constant	.846[d] (.025)	.0932[d] (.020)	.0607[d] (.018)
Family Characteristics			
Poverty Status (1, if below poverty line, 0, otherwise)	-.183[d] (.009)	.0725[d] (.007)	.1110[d] (.007)
Region of Residence (1 = urban, 0 = rural)	.003 (.009)	-.013 (.007)	.010 (.007)
Gender of Household Head (0 = male, 1 = female)	-.344[d] (.025)	.305[d] (.031)	.039[c] (.018)
Age of Household head	.0002 (.0002)	-.0003 (.0003)	.0001 (.0002)
Male Education	.0051[d] (.0008)	-.0036[d] (.0006)	-.0015[d] (.0005)
Female Education	-.0017 (.001)	.0049[d] (.0008)	-.0032[d] (.0007)
Wages			
Male Wage[b]	.0019[d] (.0002)	-.0018[d] (.0002)	0.0001 (.0002)
Female Wage[b]	-.0106[d] (.0004)	.0103[d] (.0004)	.0003 (.0003)
Child Wage[b]	-0.0109[d] (.0009)	-.0012 (.0007)	.0121[d] (.0006)
Community Characteristics			
Water Storage (1 = best, 6 = worst)	-.0017 (.002)	-.0008 (.002)	.0024 (.0016)
Disposal of Sewerage (1 = best, 6 = worst)	.0049 (.003)	-.0001 (.003)	-.0048 (.0026)
Electricity (1 = yes, 0 = no)	.0123 (.017)	.0014 (.013)	-.0137 (.018)
Joint Tests			
Community Variables	$\chi^2_3 = 2.48$	$\chi^2_3 = 0.26$	$\chi^2_3 = 6.18$

[a] Standard Errors in brackets

[b] In case of households with more than one working male and/or one working female and/or one working child, we take the maximum wage earned by them as a measure of the male, female and child wage, respectively.

[c] Significant at 5% level.

[d] Significant at 1% level.

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